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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/606,564	06/29/2000	Carol Novak	00P7752US	6896

7590 02/13/2004

Siemens Corporation
Intellectual Property Department
186 Wood Avenue South
Iselin, NJ 08830

EXAMINER	
LU, TOM Y	

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 02/13/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/606,564	NOVAK ET AL.	
	Examiner	Art Unit	
	Tom Y Lu	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 November 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment and writing response filed on November 24, 2003 has been entered.

2. Claims 1-27 are pending.

Response to Arguments

3. Applicant's arguments with respect to claims 1, 2 and 15 have been considered but are moot in view of the new ground(s) of rejection.

The Ozeki reference:

Applicant argues Ozeki only discloses a method for obtaining three-dimensional tomographic images by interpolation of a plurality of projection slices. An orientation angle of the image can be changed by manually inputting coordinate information. A slice position image representing the designated position and angle of the slice is displayed three-dimensionally in accordance with the coordinate information. However, Ozeki does not provide teaching for the newly added limitation of "a plurality of views of the given object that are displayed as a cine loop". In summary, applicant argues the Ozeki reference does not anticipate all the limitations cited in the claims.

Upon further review of specification, and in light of applicant's arguments, the examiner agrees Ozeki does not teach such limitation. Nonetheless, the technique of displaying a plurality of views of a given object as a cine loop is well known in the art. Accordingly, a new reference has been cited in the following office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozeki et al (U.S. Patent No. 4,674,046) in view of Fenster et al (U.S. Patent No. 6,461,298 B1).

Referring to Claim 1, Ozeki discloses identifying three-dimensional objects within the three-dimensional image data (Ozeki at column 5, lines 30-31 teaches obtaining three-dimensional image data through a plurality of tomographic image slices, which the operator later identifies the three-dimensional object within the three-dimensional image data and display such object at column 5, lines 51-54, see figures 1, 11A, 11B, 12A and 12B. Note even though Ozeki only discloses performing image processing on one three-dimensional object, it is understood that when a CT scanner performs scanning, multiple organs are imaged. For example, a chest image contains lungs, heart, etc. Therefore, these organs (objects) are inherently identified, but only one organ is selected and analyzed by the operator as taught in Ozeki. Therefore, the recitation of "identifying three-dimensional objects" is satisfied); for a given three-dimensional object (Ozeki teaches a given object 51 as shown in figure 11A); determining a local spinning plane for the given object (the shaded slice image 55 is the claimed "local spinning plane"), the local spinning plane being centered at a centroid (Ozeki shows a centroid in figure 11A) and a local spinning axis of the given object (figure 11A, x or y-axis); rotating the local spinning plane at least a portion of 360 degree (Ozeki in figures 11A and 12A shows the plane is rotated in

different degrees); and creating a view of the given object at predefined increments of rotation, so as to result in a plurality of views of the given object (Ozeki shows different view of the given object in figures 5-8). However, Ozeki does not disclose displaying a pluarlity of views of a given object as a cine loop. Fenster at column 19, lines 38-39, discloses a plurality of images can be computed and displayed in time order as a cine loop. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to display the plurality of views of a given object as a cine loop. One of ordinary skill in the art would have been motivated to do this because Ozeki teaches in order to rotate the object, and view it continuously, the operator needs to rapidly enter the input commands, which is very time consuming, where Fenster at column 19, lines 28-30, teaches displaying a series of three-dimensional images of the same target volume acquired at different times as a cine loop. Ozeki discloses obtaining three dimensional image data and storing the image data in a system memory at column 5, lines 30-31 and 40-41, such three dimensional image data is the same three-dimensional image data used in Fenster because Fenster at column 20, line 8, teaches the display technique can be used in the field of x-ray computed tomography. Therefore, It would be obvious to a person of ordinary skill in the art to use the three dimensional images stored in Ozeki's system memory obtained at different times, and display them as a cine loop as taught by Fenster.

5. Claims 2-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozeki in view of Fenster, and further in view of Gur et al (U.S. Patent No. 5,838,815).

a. Referring to Claim 2, Ozeki discloses "for a given three-dimensional object within at least one region: determining an extent, a centroid, and a local spinning axis of the given axis of the given object (Ozeki shows the extent, centroid and

local spinning axis in figure 11A. The centroid and the local spinning axis are explained in Claim 1. With regard to "an extent", Ozeki at column 5, lines 37-41, teaches performing linear interpolation on the tomographic slices. By performing such interpolation operation, the volume or size of the object is determined); determining a local spinning plane for the given object, the local spinning plane being centered at the centroid and the local spinning axis; rotating the local spinning plane at least a portion of 360 degrees, which said rotating step comprises the step of creating a view of the given object at predefined increments of rotation, so as to result in a plurality of views of the given object" (see explanation in Claim 1). Fenster teaches displaying a plurality of views of the given object as a cine loop. The motivation for combining Ozeki and Fenster is given in Claim 1. However, Ozeki and Fenster do not explicitly disclose receiving indicia identifying at least one region of interest in a digital medical image; and identifying three-dimensional objects within the least region of interest. Gur at column 9, lines 43-55, teaches obtaining a mammogram image as shown in figure 9a, which contains a region of interest of a female breast, and identifying suspicious masses in the breast region. Even though Gur does not teach such masses are three-dimensional objects, Gur at column 7, line 51-52 teaches it is applicable to find such masses in 3-D environment. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use identifying technique taught in Gur to identify multiple suspicious masses, and applying Ozeki's system to perform image processing on each mass. One of

ordinary skill in the art would have been motivated to do this because Gur teaches a system of identifying multiple suspicious masses, and one way to confirm whether or not the masses are positive is by examining each mass individually. Therefore, it is reasonable for a person of ordinary skill in the art to apply Ozeki's system to perform image processing on each object (or mass in Gur) by presenting the object in different viewing angles to a physician to determine if the object is abnormal.

b. Referring to Claim 3, Ozeki discloses wherein said step of determining the extent of the given object comprises the step of examining connected voxels within a predefined volume on adjacent tomographic slices (Ozeki at column 5, lines 37-41, teaches performing linear interpolation on tomographic image slices, and "interpolated data about intermediate portions 50 between the slices are used to obtained a three-dimensional object image data which then stored in a memory", such interpolated data is the claimed "connected voxels within a predefined volume on adjacent tomographic slices").

c. Referring to Claim 4, Ozeki discloses wherein the local spinning plane is initially oriented at a same angle as a current two-dimensional view of the three-dimensional digital image data (Ozeki column 6, line58-59, teaches the image slice plane is oriented as the operator wishes, and by default the local spinning plane is oriented at a same angle as a current two-dimensional view of the three-dimensional digital image data).

d. Referring to Claim 5, Ozeki discloses wherein said step of providing the plurality of views of the given object further comprises the step of providing a plurality of views of areas surrounding the given object (Ozeki shows providing a plurality of views of the given object in figures 11A and 12A, and it is shown in figure 1 that the slice plane incorporates the background area surrounding the given object).

e. Referring to Claim 6, Ozeki discloses wherein the indicia are provided from a user through one of a mouse and an eye-tracking device (Ozeki teaches use of computer keyboard and a joystick, which are functional equivalent to a mouse).

f. Referring to Claim 7, Ozeki discloses wherein said providing step further comprises the step of determining at least one of a volume, a geometrical location, and a center of mass of the given object (Ozeki shows the centroid in figure 11A).

g. Referring to Claim 8, Ozeki discloses wherein said providing step further comprises the step of determining one of a circularity and a sphericity of the given object (Ozeki: see figure 9).

h. Referring to Claim 9, Ozeki discloses wherein said providing step further comprises the step of determining a mean, a variance, and a min/max of intensity values within the given object (by performing linear interpolation as described at column 5, line 37)

i. Referring to Claim 10, Ozeki discloses wherein said providing step further comprises the step of determining a texture, a surface smoothness and regularity measures of the given object (Ozeki: column 8, lines 66-67, and column 9, lines 1-2).

j. Referring to Claim 11, Ozeki discloses providing step further comprises the step of determining two-dimensional and three-dimensional shape measures of the given object (Ozeki: column 9, lines 15-31).

k. Referring to Claim 12, Gur discloses further comprising the step of storing results from said providing step in a table for comparison with at least one of preceding or succeeding scans of a same patient (it is understood in the art that a physician keeps a record of a patient, and compare the previous examining result with the present one).

l. Referring to Claim 13, Gur discloses the step of storing a confidence value in the table that indicates an estimate of a clinical relevance of the given object (Gur at column 7, lines 65-67, teaches using a ruled-based criteria database in order to determine whether or not a particular suspicious region is a true positive region, such ruled-based criteria database is a threshold, which is the claimed "confidence value" with regard to the clinical relevance of the given object).

m. Referring to Claim 14, Gur discloses the steps of setting thresholds for particular features of particular objects that represent whether the particular objects are abnormal; and identifying a given object that exceeds a given threshold (Gur: column 9, lines 10-40).

n. With regard to Claim 15, the only difference between Claim 2 and Claim 15 is Claim 15 calls for additional limitation of "a program storage device readable by machine", Ozeki and Gur both disclose using computers to perform image

processing, which inherently contains a program storage device readable by machine.

o. With regard to Claim 16, the limitations are addressed in Claim 3.

p. With regard to Claim 17, the limitations are addressed in Claim 4.

q. With regard to Claim 18, the limitations are addressed in Claim 5.

r. With regard to Claim 19, the limitations are addressed in Claim 6.

s. With regard to Claim 20, the limitations are addressed in Claim 7.

t. With regard to Claim 21, the limitations are addressed in Claim 8.

u. With regard to Claim 22, the limitations are addressed in Claim 9.

v. With regard to Claim 23, the limitations are addressed in Claim 10.

w. With regard to Claim 24, the limitations are addressed in Claim 11.

x. With regard to Claim 25, the limitations are addressed in Claim 12.

y. With regard to Claim 26, the limitations are addressed in Claim 13.

z. With regard to Claim 27, the limitations are addressed in Claim 14.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu

LEO BOUDREAU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600